

WELDING TECHNOLOGY II

Welding Technology II includes classroom and laboratory experiences that develop a variety of skills in Gas Metal Arc welding, Flux Cored Arc Welding, Gas Tungsten Arc welding, Plasma Cutting and Carbon Arc. This course is designed for individuals who intend to pursue careers as Welders, Technicians, Sales Reps, Designers, Researchers or Engineers. Emphasis is placed on safety at all times. OSHA standards and guide lines endorsed by the American Welding Society (AWS) are used. Instructional activities emphasize properties of metals, safety issues, blueprint reading, electrical principles, welding symbols, and mechanical drawing through projects and exercises that teach students how to weld and be prepared for college and career success.

- DOE Code:5778
- Recommended Grade Level: Grade 12
- Recommended Prerequisites: Welding Technology I
- Credits: 2-3 credits per semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
 - Ivy Tech
 - WELD 207-Gas Metal Arc (MIG) Welding
 - WELD 100-Welding Processes
 - Vincennes University
 - WELD 102-Shielded Metal Arc Welding

Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in SkillsUSA, the CTSO for this area.

Content Standards

Domain 1 – Gas Metal Arc Welding

Core Standard 1 Student creates appropriate welds on a variety of industrial metals using Gas Metal Arc Welding and cutting processes to meet industry standards.

Standards

- WTII-1.1 Demonstrate and practice ALL SAFETY RULES that apply to welding
- WTII- 1.2 Communicate all common welding terms
- WTII-1.3 Apply metallurgy fundamentals to welding processes
- WTII-1.4 Performs safety inspections of GMAW equipment and accessories
- WTII-1.5 Makes minor external repairs to GMAW equipment and accessories
- WTII-1.6 Sets up for GMAW-S operations on carbon steel
- WTII-1.7 Operates GMAW-S equipment on carbon steel
- WTII-1.8 Makes fillet welds in all positions on carbon steel
- WTII-1.9 Makes groove welds in all positions on carbon steel
- WTII- 1.10 Passes GMAW-S welder performance qualification test on carbon steel
- WTII-1.11 Sets up for GMAW (spray) operations on carbon steel
- WTII-1.12 Operates GMAW (spray) equipment on carbon steel
- WTII-1.13 Makes fillet welds in the 1F and 2F positions on carbon steel
- WTII-1.14 Makes groove welds in the 1G position on carbon steel
- WTII-1.15 Passes GMAW (spray) welder performance qualification test on carbon steel
- WTII-1.16 Apply Flux Cored Arc Welding (FCAW / Gas Shielded and Self Shielded) process fundamentals
- WTII-1.17 Performs safety inspections of FCAW equipment and accessories
- WTII-1.18 Makes minor external repairs to FCAW equipment and accessories
- WTII-1.19 Sets up for FCAW- G/GM operations on carbon steel (Gas Shielded)
- WTII-1.20 Operates FCAW- G/GM equipment on carbon (Gas Shielded)
- WTII-1.21 Makes fillet welds in all positions on carbon steel (Gas Shielded)
- WTII-1.22 Makes groove welds in all positions on carbon steel (Gas Shielded)
- WTII-1.23 Passes FCAW-G/GM welder performance qualification test on carbon steel (Gas Shielded)
- WTII-1.24 Sets up for FCAW- S operations on carbon steel (Self Shielded)
- WTII-1.25 Operates FCAW- S equipment on carbon (Self Shielded)
- WTII-1.26 Makes fillet welds in all positions on carbon steel (Self Shielded)
- WTII-1.27 Makes groove welds in all positions on carbon steel (Self Shielded)
- WTII-1.28 Passes FCAW- S welder performance qualification test on carbon steel (Self Shielded)

Domain – Gas Tungsten Arc Welding

Core Standard 2 Students create appropriate Gas Tungsten Arc Welds on a variety of industrial metals to meet industry standards.

Standards

- WTII-2.1 Apply Gas Tungsten Arc Welding (GTAW) process fundamentals
- WTII-2.2 Performs safety inspections of GTAW equipment and accessories
- WTII-2.3 Makes minor external repairs to GTAW equipment and accessories
- WTII-2.4 Sets up for GTAW operations on carbon steel, austenitic steel, and aluminum
- WTII-2.5 Operates GTAW equipment on carbon steel, austenitic steel, and aluminum

- WTII-2.6 Create fillet welds in all positions on carbon steel
- WTII-2.7 Makes groove welds in all positions on carbon steel
- WTII-2.8 Makes fillet welds in the 1F, 2F and 3F positions on austenitic stainless steel
- WTII-2.9 Makes groove welds, in the 1G and 2G positions on austenitic stainless steel
- WTII-2.10 Makes fillet welds in the 1F and 2F positions on aluminum
- WTII-2.11 Makes groove welds in the 1G position on aluminum
- WTII-2.12 Passes GTAW welder performance qualifications test on carbon steel, austenitic stainless steel, and aluminum

Domain – Manual Plasma Arc Cutting and Air Carbon Arc Cutting

Core Standard 3 Students create appropriate Manual Plasma Arc Cutting and Air Carbon Arc Cutting cutting processes on a variety of industrial metal to meet industry standards.

Standards

- WTII-3.1 Performs safety inspections of manual PAC equipment and accessories
- WTII-3.2 Makes minor external repairs to manual PAC equipment and accessories
- WTII-3.3 Sets up for manual Pac operations on carbon Steel, austenitic stainless steel, and aluminum
- WTII-3.4 Operates manual Pac equipment on carbon steel, stainless steel, and aluminum
- WTII-3.5 Performs straight, square cutting operations, in the flat position on carbon steel, stainless steel, and aluminum
- WTII-3.6 Performs shape, edge cutting operations in the flat position on carbon steel, stainless steel, and aluminum
- WTII-3.7 Performs safety inspections of manual CAC-A equipment and accessories
- WTII-3.8 Makes minor external repairs to manual CAC- A equipment and accessories
- WTII-3.9 Sets up manual CAC-A scarfing and gouging operations on carbon steel
- WTII-3.10 Operates manual CAC-A equipment on carbon steel
- WTII-3.11 Performs scarfing and gouging operations to remove base and weld metal, in the flat and horizontal positions on carbon steel

Process Standards

Common Core Literacy Standards for Technical Subjects

Reading Standards for Literacy in Technical Subjects 11-12

The standards below begin at grade 11 and define what students should understand and be able to do by the end of grade 12. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

Key Ideas and Details

- 11-12.RT.1 Cite specific textual evidence to support analysis of technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- 11-12.RT.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

- 11-12.RT.3 Follow precisely a complex multistep procedure when performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure

- 11-12.RT.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific context relevant to *grades 11-12 texts and topics*.
- 11-12.RT.5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- 11-12.RT.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

Integration of Knowledge and Idea

- 11-12.RT.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- 11-12.RT.8 Evaluate the hypotheses, data, analysis, and conclusions in a technical subject, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- 11-12.RT.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Range of Reading and Level of Text Complexity

- 11-12.RT.10 By the end of grade 12, read and comprehend technical texts in the grades 11-CCR text complexity band independently and proficiently.

Writing Standards for Literacy in Technical Subjects 11-12

The standards below begin at grade 11 and define what students should understand and be able to do by the end of grade 12. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

Text Types and Purposes

- 11-12.WT.1 Write arguments focused on *discipline-specific content*.
- 11-12.WT.2 Write informative/explanatory texts, including technical processes.
- 11-12.WT.3 Students will not write narratives in technical subjects. *Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In technical, students must be able to write precise enough descriptions of the step-by-step procedures they use in their technical work that others can replicate them and (possibly) reach the same results.*

Production and Distribution of Writing

- 11-12.WT.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- 11-12.WT.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

- 11-12.WT.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

- 11-12.WT.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- 11-12.WT.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation
- 11-12.WT.9 Draw evidence from informational texts to support analysis, reflection, and research.

Range of Writing

- 11-12.WT.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.